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EXAMINER	
SCIACCA, SCOTT M	
ART UNIT	PAPER NUMBER
2146	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/537,064	DE BUNJE ET AL.	
	Examiner	Art Unit	
	Scott M. Sciacca	2146	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 December 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This office action is responsive to communications filed on December 11, 2007. New claims 8-20 have been added. Claims 1-20 are pending in the application.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 8 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

The system of Claim 8 recites "a determiner" as one of its elements. The specification does not provide the proper antecedent basis for the language in this limitation. Additionally, the specification does not mention a specific device, component of a device, or any other component that actually performs the determination mentioned in Claim 8.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 8-17 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 8 is drawn to a system which comprises "a determiner" and "a scheduler". In accordance with Applicant's specification, these elements may reasonably be interpreted as software per se. This subject matter is not limited to that which falls within a statutory category of invention because it is not limited to a process, machine, manufacture, or a composition of matter. Note that in order for the claimed system to fall within a statutory category of invention, at least one of the claimed elements must be a physical device.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Kaiserswerth et al. (US 6,195,701).

Regarding Claim 18, Kaiserswerth teaches a method, comprising:

defining a current time box for each of a plurality of components, wherein each current time box has a start time and an end time, and each component processes data elements in at least one corresponding current time box (*"In the example given in FIG. 3, a data unit from stream 1 cannot be played out before a time mark 30 (S1Start) and it*

must be played out before a time mark 31 (S1End)" – See Col. 2, lines 65-66 & Col. 3, lines 1-2); and

scheduling a first of the plurality of the components for execution when all data elements with time stamps in the first component's current time box are present, wherein all of the data elements for the first component are present in the first component's current time box before all data elements for another one of the plurality of components are present in a corresponding current time box (*"IF both data units are in the READY state THEN they can be played out"* – See Col. 3, lines 14-15; Fig. 2 shows a plurality of streams originating from separate components arriving at different points in time. Thus, all data elements from a first component are present before all data elements from a second component).

Regarding Claim 19, Kaiserswerth teaches the data elements being from a stream of data elements in which each data element in the stream is time stamped (Fig. 2 shows a plurality of streams with timestamps 23).

Regarding Claim 20, Kaiserswerth teaches each of the schedulable components having a corresponding earliest time at which it can contribute to the output of the real time system, and wherein the total earliest time is an earliest of the earliest times of the schedulable components (*"a data unit from stream 1 cannot be played out before a time mark 30 (S1Start)"* – See Col. 2, lines 65-66 & Col. 3, line 1; The total earliest time

belongs to a stream having an S1Start value that is earlier in time than the rest of the streams).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1, 3-5, 8-10, 12-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaiserswerth et al. (US 6,195,701) in view of Dave (US 6,178,542).

Regarding Claim 1, Kaiserswerth teaches a method of scheduling schedulable component in a hard real time system for processing time dependent streams of data elements (*"The present invention concerns a method and apparatus for the synchronization and the scheduling of multiple data streams as well as for the scheduling of tasks in operating systems with hard real-time requirements"* – See Col. 1, lines 8-11), where the number of schedulable components is larger than the number of available processors for processing said components (Fig. 1 shows a single CPU **12** and Fig. 2 shows a plurality of streams – **Stream 1**, **Stream 2** and **Stream 3**) and where each of said components has at least one input and one output (*"In multimedia systems multiple data streams must be synchronized and scheduled for playout to, for example,*

a speaker 15 and a video display 14" – See Col. 2, lines 47-49) characterized in that the method comprises the steps of consecutively:

determining for each schedulable component the earliest time on which said component can contribute to the output of said hard real time system (*"In the example given in FIG. 3, a data unit from stream 1 cannot be played out before a time mark 30 (S1Start) and it must be played out before a time mark 31 (S1End)"* – See Col. 2, lines 66-67 & Col. 3, lines 1-2),

Kaiserswerth does not explicitly teach scheduling *only* the schedulable component that can contribute at the total earliest time to the output of said real time system. However, Dave does teach scheduling only the schedulable component that can contribute at the total earliest time to the output of said real time system (*"Each periodic task graph has an earliest start time (est)"* – See Col. 5, lines 62-63; *"If the execution slot cannot be allocated at the required instant, the algorithm schedules it at the earliest possible time and repositions the remaining slots to ensure that the deadlines are always met"* – See Col. 12, lines 22-25; *"These approaches either minimize the probability of not meeting the deadline during allocation of tasks on a given architecture or minimize the response times"* – See Col. 3, lines 63-65).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to schedule a component that can contribute at the earliest time for output of a real-time system. One of ordinary skill would have been motivated to do so because scheduling schemes such as this are well-known in the art of real-time

systems for providing an optimal strategy for ensuring components meet their deadlines.

Regarding Claim 3, Kaiserswerth teaches a method according to Claim 1, wherein a length of a predefined time interval is specified for each component and a component is schedulable when time stamped data elements from said predefined time interval of said time dependent stream of time stamped data element is available at all inputs of said component (*"A stream may be synchronized to one or multiple other streams or to time stamps 23 defined by an external clock"* – See Col. 2, lines 52-54; *"A data stream is a sequence of data units. In FIG. 3, the synchronization of two data units is illustrated. The SyncPoints are translated to time marks relative to the system which processes the received data streams"* – See Col. 2, lines 61-64).

Regarding Claim 4, Kaiserswerth teaches a method according to Claim 3, wherein the availability of said predefined time interval of said time stamped data elements is determined by defining a begin time and an end time of said predefined time interval (*"In the example given in FIG. 3, a data unit from stream 1 cannot be played out before a time mark 30 (S1Start) and it must be played out before a time mark 31 (S1End)"* – See Col. 2, lines 66-67 & Col. 3, lines 1-2) and checking when the time, until which data has been processed by a preceding component, is newer than the end time of said predefined time interval (Fig. 4 illustrates checking when the time is newer than the end of the predetermined time interval, S1End).

Regarding Claim 5, Kaiserswerth teaches a method according to Claim 3, wherein the step of determining the earliest time on which said component can contribute to the output is performed by:

identifying possible paths of subsequent components that the data elements have to be processed by in order to reach the output of said system from said component (*"In multimedia systems multiple data streams must be synchronized and scheduled for playout to, for example, a speaker 15 and a video display 14, as illustrated in FIG. 1."* – See Col. 2, lines 47-49), and

determining the earliest time on which said component can contribute to the output as the earliest determined contribution time (*"After SxStart and before SxEnd it is in the READY state"* – See Col. 3, lines 6-7).

Dave teaches determining an earliest contribution time for each possible path by subtracting from the begin time of said predefined time interval the length of each of the predefined time intervals specified for each of said subsequent components in said path (*"In an alternate embodiment, the transmission interval may also be calculated"* – See Col. 3, lines 10-11; *"If there are several modules to be transmitted simultaneously, the transmission interval may be calculated by dividing the aggregate size of the modules by the transmission bit rate"* – See Col. 3, lines 14-17; *"The scheduler can then subtract the transmission interval from the delivery time to determine a transmission start time 42"* – See Col. 6, lines 35-37).

Regarding Claim 8, Kaiserswerth teaches a system, comprising:

a determiner that determines an execution time, for each of a plurality of schedulable components, at which an output of each schedulable component is able to be processed by the system (*"In the example given in FIG. 3, a data unit from stream 1 cannot be played out before a time mark 30 (S1Start) and it must be played out before a time mark 31 (S1End)"* – See Col. 2, lines 66-67 & Col. 3, lines 1-2), wherein a component is schedulable only if the component has processed all data elements with time stamps in a corresponding processing time interval (*"Before SxStart of a data stream x has been reached, the respective data unit is in the WAIT state. After SxStart and before SxEnd it is in the READY state"* – See Col. 3, lines 5-7).

Kaiserswerth does not explicitly teach a scheduler that schedules processing of the output of *only one* of the schedulable components by the system based on the execution times of the plurality of schedulable components.

Dave teaches a scheduler that schedules processing of the output of only one of the schedulable components by the system based on the execution times of the plurality of schedulable components (*"Each periodic task graph has an earliest start time (est)"* – See Col. 5, lines 62-63; *"If the execution slot cannot be allocated at the required instant, the algorithm schedules it at the earliest possible time and repositions the remaining slots to ensure that the deadlines are always met"* – See Col. 12, lines 22-25).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a scheduler that schedules processing of the output of only one of the schedulable components by the system based on the execution times of the

plurality of schedulable components for the same reasons as those given with respect to Claim 1.

Regarding Claim 9, Kaiserswerth teaches the component not being schedulable if the component has not processed all of the data elements with time stamps in the corresponding processing time interval (*"Before SxStart of a data stream x has been reached, the respective data unit is in the WAIT state"* – See Col. 3, lines 5-6).

Regarding Claim 10, Dave teaches the scheduled schedulable component having the earliest execution time (*"Each periodic task graph has an earliest start time (est)"* – See Col. 5, lines 62-63; *"If the execution slot cannot be allocated at the required instant, the algorithm schedules it at the earliest possible time and repositions the remaining slots to ensure that the deadlines are always met"* – See Col. 12, lines 22-25).

Regarding Claim 12, Kaiserswerth teaches the data elements being from a data stream (*"The present invention concerns a method and an apparatus for the synchronization and the scheduling of multiple data streams and real time tasks"* – See Abstract).

Regarding Claim 13, Kaiserswerth teaches the processing time interval being a predefined time box with a start time and an end time (*"a data unit from stream 1 cannot*

be played out before a time mark 30 (S1Start) and it must be played out before a time mark 31 (S1End)" – See Col. 2, lines 66-67 & Col. 3, lines 1-2).

Regarding Claim 14, Kaiserswerth teaches the data elements being produced by a preceding component (*"According to this example, two data streams are received by means 18 for extraction of time marks. The first data stream originates from a storage disk 16, whereas the second data stream is sent via a network 17 to said means 18"* – See Col. 3, lines 38-42).

Regarding Claim 15, Kaiserswerth teaches the schedulable component being a self-contained part of the system, performing a sub-task that is atomic (Storage disk 16 is part of the system disclosed by Kaiserswerth. It performs the sub-task of storing data).

Regarding Claim 16, Kaiserswerth teaches the system being a hard real time system for processing time dependent streams of data elements (*"The present invention concerns a method and an apparatus for the synchronization and the scheduling of multiple data streams and real time tasks"* – See Abstract).

Regarding Claim 17, Kaiserswerth teaches the execution time being based on algorithmic time and is converted to real time once the output is processed (*"The*

SyncPoints might be translated to time marks by means of a clock or counter of said system" – See Col. 2, lines 64-66).

9. Claims 2 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaiserswerth et al. (US 6,195,701) in view of Dave (US 6,178,542) and further in view of Kamiya (US 2001/0026558).

Regarding Claim 2, Kaiserswerth and Dave do not explicitly teach the method wherein if a number of schedulable components contribute to the output of said real time system at the same total earliest time, then scheduling of said number of components is performed using push scheduling. However, Kamiya does teach scheduling components using push scheduling (*"there is provided a distributed pipeline scheduling method for a system"* – See [0031]). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use push scheduling for components that contribute to the output of a real time system at the same earliest time. One would have been motivated to do so in order to provide a mechanism for dealing with components that are simultaneously in contention for the output of the real time system.

Regarding Claim 11, Kaiserswerth and Dave do not explicitly teach push scheduling being employed when two of the plurality of schedulable components have the earliest execution time.

However, Kamiya does teach push scheduling being employed when two of the plurality of schedulable components have the earliest execution time (*"there is provided a distributed pipeline scheduling method for a system"* – See [0031]).

It would have been obvious to use push scheduling for the same reasons as those given with respect to Claim 2.

10. Claims 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kaiserswerth et al. (US 6,195,701) in view of Dave (US 6,178,542) and further in view of Vogl et al. (7,150,017).

Regarding Claim 6, Kaiserswerth teaches a method according to Claim 3, wherein the step of determining the earliest time on which said component can contribute to the output is performed by:

identifying possible paths of subsequent components that the data elements have to be processed by in order to reach the output of said system from said component (*"In multimedia systems multiple data streams must be synchronized and scheduled for playout to, for example, a speaker 15 and a video display 14, as illustrated in FIG. 1."* – See Col. 2, lines 47-49), and

determining the earliest time on which said component can contribute to the output as the earliest determined contribution time (*"After SxStart and before SxEnd it is in the READY state"* – See Col. 3, lines 6-7).

Dave teaches determining an earliest contribution time for each possible path by subtracting from the begin time of said predefined time interval the length of each of the predefined time intervals specified for each of said subsequent components in said path (*"In an alternate embodiment, the transmission interval may also be calculated"* – See Col. 3, lines 10-11; *"If there are several modules to be transmitted simultaneously, the transmission interval may be calculated by dividing the aggregate size of the modules by the transmission bit rate"* – See Col. 3, lines 14-17; *"The scheduler can then subtract the transmission interval from the delivery time to determine a transmission start time 42"* – See Col. 6, lines 35-37).

Kaiserswerth and Dave do not explicitly teach predefined time intervals having been subtracted a displacement value. Vogl teaches time intervals having a displacement value (*"In an alternate embodiment, the duration 220 field could hold a number which indicated an offset (perhaps in seconds) against the release time 210"* – See Col. 7, lines 49-52).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to subtract a displacement value from predefined time intervals in order to adjust the time interval wherein a component will contribute to the output of a real time system.

11. Claims 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kaiserswerth et al. (US 6,195,701) in view of Dave (US 6,178,542) and further in view of Willard (US 6,374,405).

Regarding Claim 7, Kaiserswerth and Dave do not explicitly teach none of the other schedulable components being scheduled until after the scheduled schedulable component is processed and contributes to the output of the real time system. However, Willard does teach none of the other schedulable components being scheduled until after the scheduled schedulable component is processed and contributes to the output of the real time system (*"In FIG. 7a, all of the packets of a single module (Mod. 1) are to transmitted consecutively"* – See Col. 9, lines 21-22; *"A second module (Mod. 2) can be scheduled in the same manner for transmission after the first module"* – See Col. 9, lines 33-35; The scheduling Willard's disclosure relates to scheduling modules of data for output from a source to a receiver).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to schedule a next component only after the current component is finished being processed and has contributed to the output of a real time system. Motivation for doing so would be to ensure that modules are delivered by a particular time.

Response to Arguments

12. Applicant's arguments filed on December 11, 2007 have been fully considered but they are not persuasive.

With respect to Claim 2, Applicant argues that Kamiya does not disclose push scheduling. In accordance with page 2, lines 11-15 of Applicant's specification, Examiner interpreted push scheduling as being synonymous with pipeline scheduling. Based on this reasoning, Examiner believes Kamiya teaches pipeline scheduling, and thus also teaches push scheduling.

13. Applicant's arguments with respect to Claims 1, 5 and 6 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott M. Sciacca whose telephone number is (571) 270-1919. The examiner can normally be reached on Monday thru Friday, 7:30 A.M. - 5:00 P.M. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeff Pwu can be reached on (571) 272-6798. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Scott M. Sciacca/
Examiner, Art Unit 2146

/JEFF PWU/
Supervisory Patent Examiner, Art Unit 2146